510(K) SUMMARY FOR THE INVACARE FLYER, Model XPO100

This summary of 510(k) safety and effectiveness information is being supplied in accordance with the requirements of the SMDA of 1990 and 21 CFR 807.92

The assigned $510(k)$ number is _	
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Date: July 10, 2007

Submitted by: Invacare Corporation

Registration No. 1525712

One Invacare Way

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Telephone: 440-326-6356

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Contact Person: Mr. Carroll Martin

Trade Name: The Flyer

Model: XPO100

Common Name: Oxygen Concentrator

Classification Name: Generator, Oxygen, Portable per 21 CFR 868.5440

Legally Marketed Predicate Device(s): Inogen One Oxygen Concentrator; K032818, May 13, 2004

<u>Device Description:</u> The Invacare Flyer is used by patients with respiratory disorders who require supplemental oxygen. The device can be used in the home, an institutional environment or in a vehicle or other mobile environment. The device is not intended to sustain or support life. The device is used with a nasal cannula to direct oxygen from the device to the patient.

The Invacare Flyer provides oxygen in pulsed demand flow dosages at settings of 1 through 5. The oxygen concentration level of the output gas ranges from 87% to 95.6%.

Standard power options include an AC to DC switching power supply operating from AC power outlet (120 VAC/ 60 Hertz nominal), a DC to DC switching power supply operating from accessory outlets typically found in a mobile vehicle type environment (12 VDC nominal) and an external rechargeable battery.

The Invacare Flyer uses a molecular sieve and pressure swing adsorption methodology to produce the oxygen gas output. Ambient air enters the device, is filtered and then compressed. This compressed air is then directed toward one of two nitrogen adsorbing sieve beds. Concentrated oxygen exits the

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opposite end of the active sieve bed and is directed into an oxygen reservoir where it is delivered to the patient in specific volumes during the inhalation portion of a detected breath.

The basic technology of the Invacare Flyer is equivalent to other approved oxygen concentrators. The principles of operation are equivalent to the noted predicate device.

<u>Intended Use:</u> The Invacare Flyer is intended to be used by patients with respiratory disorders who require supplemental oxygen. It supplies a high concentration of supplemental oxygen and is used with a nasal cannula to channel oxygen from the concentrator to the patient. The Invacare Flyer can be used in a home, institution, vehicle and various mobile environments. The Invacare Flyer does not nor is it intended to sustain or support life.

Substantial Equivalence:

Features	The Invacare Flyer	Predicate Device	
reatures	The invacant Phyci	Inogen One Oxygen Concentrator	
510(k) Number	TBD	K032818	
Date Cleared	TBD	05/13/2004	
Intended Use	The Invacare Flyer is intended to be used by patients with respiratory disorders who require supplemental oxygen. It supplies a high concentration of supplemental oxygen and is used with a nasal cannula to channel oxygen from the concentrator to the patient. The Invacare Flyer can be used in a home, institution, vehicle and various mobile environments. The Invacare Flyer does not nor is it intended to sustain or support life.	The Inogen One Oxygen Concentrator is used on a prescriptive basis by patients requiring supplemental oxygen. It supplies a high concentration of oxygen and is used with a nasal cannula to channel oxygen from the concentrator to the patient. The Inogen One Oxygen Concentrator may be used in a home, institution, vehicles and various mobile environments.	
Method by which Oxygen is Released	Molecular sieve (mechanical)	Molecular sieve (mechanical)	
Process by which Oxygen is Released	Pressure swing adsorption	Pressure swing adsorption	
Sieve Bed Material	Synthetic zeolite	Synthetic zeolite	
Software/Hardware Analog and digital electronics with microprocessor		Analog and digital electronics with microprocessor	
Flow Control	Microprocessor controlled valves	Microprocessor controlled valves	
Weight	< 7.0 lbs. (with non-removable internal battery) 9.8 lbs. (device 8.3 lbs.;		
Size			
Height	10.0" +/- 1"	12.39"	
Width	7.0" +/- 1"	6.00"	
Depth	4.3" +/- 1"	11.62"	
Oxygen Purity	87% minimum at all flow rates	"Approximately 90%"	

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Flow Rates	Pulse Flow – 1, 2, 3, 4, 5	Pulse Flow – 1, 2, 3, 4, 5
Power Options	AC power supply 100-240 V, 50/60 Hz; DC power supply 11-16 V	AC power supply 100-240V, 50/60 Hz; Mobile Power Charger for mobile DC use.
Battery	Li-ion, 14.8 Volt, 5.2 Ah	Li-ion, 14.8 Volt, 6.6 Ah

As the chart above shows, the Invacare Flyer is comparable to its predicate. Both devices have the same intended use for the same patient population, extract oxygen from air using the same methodology, provide comparable oxygen purity and are powered in the same manner.

Design Standards: The Invacare Flyer has been designed referencing the following standards:

Standard or Agency	Title
ASTM 1464-93 (2005)	Standard Specification for Oxygen Concentrators for Domiciliary Use
ISO 8359; 1996	Oxygen Concentrators for Medical Use - Safety Requirements
UL 1097, 5th ed., 2004	UL Standard for Safety for Double Insulation Systems for Use in Electrical Equipment, UL 1097
UL 1431, 2nd ed., 1996	UL Standard for Safety for Personal Hygiene and Health Care Appliances, UL1431 (with revisions from 2003)
EN 55011:1998	Limits and methods of measurement of radio disturbance characteristics and medical (ISM) radio-frequency equipment
IEC 60601-1; 3 rd ed. 2006	Medical Electrical Equipment – Part 1 – General requirements for basic safety and essential performance
IEC 60601-1-2; 3 rd ed. 2007	Medical Electrical Equipment – Part 1-2 – Collateral standard: Electromagnetic compatibility
IEC 61000-3-2: 2005	Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)
EN 61000-3-3: 2005	Electromagnetic compatibility (EMC). Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection
IEC61000-4-2; 1.2 ed. 2001	Electrostatic Discharge Immunity Test w/ Amendments 1&2
IEC61000-4-3; 3rd ed. 2006	Radiated, RF, Electromagnetic Field Immunity Test
IEC61000-4-4; 2nd ed. 2007	Electrical Fast Transient/Burst Immunity Test w/ Amendments 1&2

IEC61000-4-5; 2nd ed. 2005 Surge Immunity Test

IEC61000-4-6; 1st ed. 2006 Immunity to Conducted Disturbances Induced by RF fields w/

Amendments 1&2

IEC61000-4-8; 1.1 ed. 2001 Power Frequency Magnetic Field Immunity Tests

IEC61000-4-11; 4th ed. 2004 Voltage Dips, Short Interruptions and Voltage Variations Immunity
Tests w/ Amendment 1

FDA Reviewer's Guide 93 Reviewer Guidance for Premarket Notification Submissions

Performance Testing: The Invacare Flyer has been tested in accordance with the following:

Standard or Agency	Title
EN 60601-1-2; 2 nd ed. 2001	Medical Electrical Equipment – Sec 1.2 – Collateral standard: Electromagnetic compatibility
IEC 60601-1-2; 2.1 ed.	Medical Electrical Equipment – Sec 1.2 – Collateral standard: Electromagnetic compatibility
EN 55011:1998	Limits and methods of measurement of radio disturbance characteristics and medical (ISM) radio-frequency equipment
CISPR 11: 2003	Limits and methods of measurement of radio disturbance characteristics and medical (ISM) radio-frequency equipment
EN61000-4-3; 2002 IEC61000-4-3; 2006	Radiated, RF, Electromagnetic Field Immunity Test Radiated, RF, Electromagnetic Field Immunity Test
EN 61000-4-4; 1995 IEC 61000-4-4; 2004	Electrical Fast Transient/Burst Immunity Test Electrical Fast Transient/Burst Immunity Test
EN 61000-4-5; 1995 IEC 61000-4-5; 2005	Surge Immunity Test Surge Immunity Test
EN 61000-4-6; 1996 IEC 61000-4-6; 2006	Immunity to Conducted Disturbances Induced by RF fields Immunity to Conducted Disturbances Induced by RF fields
EN 61000-4-8; 2001	Power Frequency Magnetic Field Immunity Tests

EN 61000-4-11; 1995	Voltage Dips, Short Interruptions and	Voltage Variations Immunity

Tests

IEC 61000-4-11; 2004 Voltage Dips, Short Interruptions and Voltage Variations Immunity

Tests

EN 61000-3-2: 2000 Limits for Harmonic Current Emissions IEC 61000-3-2: 2005 Limits for Harmonic Current Emissions

EN 61000-3-3: 1995 Voltage fluctuations and flicker Tests IEC 61000-3-3: 2005 Voltage fluctuations and flicker Tests

IEC 60601-1: 2nd ed. 1998 Medical Electrical Equipment, Part 1: General requirements for basic

safety and performance

with Amendment 1: 1991 with Amendment 2: 1995

UL 60601-1: 1st ed. 2003 Medical Electrical Equipment, Part 1: General requirements for basic

safety and performance

CSA 601.1 M90 Medical Electrical Equipment, Part 1: General requirements for basic

safety and performance

Quasi-Static Electric Field Reviewer Guidance for premarket notification submissions 1993

FDA Reviewer's Guide:1993 Electrostatic Discharge Immunity Test per Sec. m,7,ii,a.

FDA Reviewer's Guide: 1993 Reviewer Guidance for Premarket Notification Submissions

<u>Performance Data:</u> The performance data found in this submission shows that the Invacare Flyer performs as intended and in a manner that is substantially equivalent to the predicate device.

<u>Conclusion:</u> The data presented in this submission shows that the Invacare Flyer performs as intended and in a manner that is substantially equivalent to the predicate devices.

Executive Summary

Device Description

The Invacare Flyer is used by patients with respiratory disorders who require supplemental oxygen. The device is not intended to sustain or support life.

The basic technology of the Invacare Flyer is equivalent to other approved oxygen concentrators. The principles of operation are equivalent to the noted predicate device. The oxygen concentration level of the output gas ranges from 87% to 95.6%. The oxygen is delivered to the patient through the use of a nasal cannula. When the demand for oxygen is detected, the oxygen is delivered through pulsed flow with pulse flow settings of 1 through 5.

The Invacare Flyer uses a molecular sieve and pressure swing adsorption methodology to produce the oxygen gas output. Ambient air enters the device, is filtered and then compressed. This compressed air is then directed toward one of two nitrogen adsorbing sieve beds. Concentrated oxygen exits the opposite end of the active sieve bed and is directed into an oxygen reservoir where it is delivered to the patient in specific volumes during the inhalation portion of a detected breath.

The Invacare Flyer is capable of operation by the patient in a home environment, in an institutional environment, in a vehicle or other mobile environment. Device standard power options include an AC to DC switching power supply operating from AC power outlet (120 VAC/ 60 Hertz nominal), a DC to DC switching power supply operating from accessory outlets typically found in a mobile vehicle type environment (12 VDC nominal) and an external rechargeable battery.

The Invacare Flyer has several lights and indicators providing the user with information regarding the operation of the device:

- 1. Start-Up Indicator the Flyer will briefly light all LEDs and output a brief audible beep when first turned on to indicate the unit is operational.
- 2. Breath Detect Indicator the Flyer will output a defined pulse of oxygen each time it detects an inhalation. The blue flow setting indicator light will blink each time an inhalation is detected and the Flyer outputs a pulse of oxygen.
- 3. Internal Battery Charging Indicator the battery gauge will be illuminated during charging to indicate the internal batter charge status. When the battery is fully charged, all four battery gauge display LEDs will illuminate continuously.
- 4. Low Battery Warning when the Flyer's internal battery (or external battery, if applicable) charge level falls to 25% capacity, a brief audible beep will sound and the lowest level battery gauge display LED will blink.
- 5. Low Battery Alarm when the Flyer's internal battery (or external battery, if applicable) charge level falls to 15% capacity, a brief audible double beep will sound and the lowest level battery gauge display LED will blink rapidly..

- 6. Battery Discharged Alarm when the Flyer's internal battery (or external battery, if applicable) charge level falls to a minimum capacity, a brief audible triple beep will sound, the lowest level battery gauge display LED will blink very rapidly and the unit will shutdown.
- 7. No Breath Detect Alarm when the Flyer is operating but does not sense breathing within a predetermined time period (e.g 60 seconds), a constant audible alarm sounds and the red alarm indicator light will illuminate continuously.
- 8. Breath Rate Over Capacity Alarm if the breathing rate exceeds the capacity of the Flyer, a rapid audible beep sounds and the red alarm indicator light will illuminate intermittently.
- 9. System Too Hot/Cold for Start Alarm if the Flyer senses temperatures outside factory set levels upon start-up, the unit will alarm with a rapid audible beep, the red alarm indicator light will illuminate continuously, the unit will not operate and the flow setting 1 & 2 blue indicator lights will illuminate.
- 10. System Too Hot/Cold Running Alarm if the Flyer senses temperatures outside factory set levels during operation, the unit will alarm with a rapid audible beep, the red alarm indicator light will illuminate continuously, the unit will not operate and the flow setting 1 & 3 blue indicator lights will illuminate.
- 11. Battery Too Hot/Cold Alarm if the Flyersinternal battery senses temperatures outside a factory defined temperature range while the unit is operating, the unit will alarm with a rapid audible beep, the red alarm indicator light will illuminate continuously, the unit will stop running and the flow setting 1 & 4 blue indicator lights will illuminate.
- 12. Stuck Button Alarm During power up of the unit, if it detects that a button is stuck or being pressed too early, the unit will alarm with a rapid audible beep, the red alarm indicator light will illuminate continuously, the unit will not operate and the flow setting 1 & 5 blue indicator lights will illuminate.
- 13. Operating Alarm If units detects abnormal operating conditions in the unit (such as over and under pressure), the unit will alarm with a rapid audible beep, the red alarm indicator light will illuminate continuously, the unit will not operate and the flow setting 3 & 4 blue indicator lights will illuminate.
- 14. Compressor Alarm If units detects abnormal compressor conditions (such as Locked Rotor or RPM error), the unit will alarm with a rapid audible beep, the red alarm indicator light will illuminate continuously, the unit will not operate and the flow setting 4 & 5 blue indicator lights will illuminate.
- 15. System Alarm If units detects abnormal system conditions (such as Watchdog Timer error), the unit will alarm with a rapid audible beep, the red alarm indicator light will illuminate continuously, the unit will not operate and the flow setting 3,4 & 5 blue indicator lights will illuminate.

<u>Intended Use:</u> The Invacare Flyer is intended to be used by patients with respiratory disorders who require supplemental oxygen. It supplies a high concentration of supplemental oxygen and is used with a

nasal cannula to channel oxygen from the concentrator to the patient. The Invacare Flyer can be used in a home, institution, vehicle and various mobile environments. The Invacare Flyer does not nor is it intended to sustain or support life.

Device Comparison Table

Features	The Invacare Flyer	Predicate Device Inogen One Oxygen Concentrator	
510(k) Number	TBD	K032818	
Date Cleared	TBD	05/13/2004	
Intended Use	The Invacare Flyer is intended to be used by patients with respiratory disorders who require supplemental oxygen. It supplies a high concentration of supplemental oxygen and is used with a nasal cannula to channel oxygen from the concentrator to the patient. The Invacare Flyer can be used in a home, institution, vehicle and various mobile environments. The Invacare Flyer does not nor is it intended to sustain or support life.	The Inogen One Oxygen Concentrator is used on a prescriptive basis by patients requiring supplemental oxygen. It supplies a high concentration of oxygen and is used with a nasal cannula to channel oxygen from the concentrator to the patient. The Inogen One Oxygen Concentrator may be used in a home, institution, vehicles and various mobile environments.	
Method by which Oxygen is Released	Molecular sieve (mechanical) Molecular sieve (mechanical)		
Process by which Oxygen is Released	xygen is Pressure swing adsorption Pressure swing adsorpti		
Sieve Bed Material	Synthetic zeolite	Synthetic zeolite	
Software/ Hardware	Analog and digital electronics with microprocessor	Analog and digital electronics with microprocessor	

Features	The Invacare Flyer	Predicate Device Inogen One Oxygen Concentrator Microprocessor controlled valves	
Flow Control	Microprocessor controlled valves		
Weight	< 7.0 lbs. (with internal battery)	9.8 lbs. (device 8.3 lbs.; insertable battery 1.5 lbs.)	
Size:			
Height	10.0" +/- 1"	12.39"	
Width	7.0" +/- 1"	6.00"	
Depth	4.3" +/- 1"	11.62"	
Oxygen Purity	87% minimum at all flow rates	"Approximately 90%"	
Flow Rates	Pulse Flow – 1, 2, 3, 4, 5	Pulse Flow – 1, 2, 3, 4, 5	
Power Options	AC power supply 100-240 V, 50/60 Hz; DC power supply 11-16 V AC power supply 100-240 V, 50/60 Hz; Hz; Mobile Power Charger for DC use.		
Battery	Li-ion, 14.8 Volt, 5.2 Ah	Li-ion, 14.8 Volt, 6.6 Ah	

As the chart above shows, the Invacare Flyer is comparable to its predicate. Both devices have the same intended use for the same patient population, extract oxygen from air using the same methodology, provide comparable oxygen purity and are powered in the same manner. The main differences between the two devices are the weight and physical dimensions. Testing shows that these differences have no effect on safety or effectiveness.

<u>Performance Testing:</u> The Invacare Flyer has been tested in accordance with the following:

Medical Electrical Equipment – Sec 1.2 – Collateral standard: Electromagnetic compatibility Medical Electrical Equipment – Sec 1.2 – Collateral standard: Electromagnetic compatibility
Limits and methods of measurement of radio disturbance characteristics and medical (ISM) radio-frequency equipment
Limits and methods of measurement of radio disturbance characteristics and medical (ISM) radio-frequency equipment
Radiated, RF, Electromagnetic Field Immunity Test Radiated, RF, Electromagnetic Field Immunity Test
Electrical Fast Transient/Burst Immunity Test Electrical Fast Transient/Burst Immunity Test
Surge Immunity Test Surge Immunity Test
Immunity to Conducted Disturbances Induced by RF fields Immunity to Conducted Disturbances Induced by RF fields

EN 61000-4-8; 2001	Power Frequency Magnetic Field Immunity Tests		
EN 61000-4-11; 1995 IEC 61000-4-11; 2004	Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests		
EN 61000-3-2: 2000 IEC 61000-3-2: 2005	Limits for Harmonic Current Emissions Limits for Harmonic Current Emissions		
EN 61000-3-3: 1995 IEC 61000-3-3: 2005	Voltage fluctuations and flicker Tests Voltage fluctuations and flicker Tests		
IEC 60601-1: 2 nd ed. 1998	Medical Electrical Equipment, Part 1: General requirements for basic safety and performance		
with Amendment 1: 1991 with Amendment 2: 1995			
UL 60601-1: 1 st ed. 2003	Medical Electrical Equipment, Part 1: General requirements for basic safety and performance		
CSA 601.1 M90	Medical Electrical Equipment, Part 1: General requirements for basic safety and performance		

Quasi-Static Electric Field Reviewer Guidance for premarket notification submissions 1993

FDA Reviewer's Guide:1993 Electrostatic Discharge Immunity Test per Sec. m,7,ii,a.

FDA Reviewer's Guide:1993 Reviewer Guidance for Premarket Notification Submissions

The results of the testing have shown that the Invacare Flyer is safe and effective for its intended use and substantially equivalent to its predicate.



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Food and Drug Administration 9200 Corporate Boulevard Rockville MD 20850

Mr. Carroll L. Martin Regulatory Affairs Manager Invacare Corporation One Invacare Way P.O.Box 4028 Elyria, Ohio 44036-2125

Re: K071928

Trade/Device Name: Invacare Flyer, Model XPO100

Regulation Number: 21 CFR 868.5440

Regulation Name: Portable Oxygen Generator

Regulatory Class: II Product Code: CAW Dated: November 8, 2007 Received: November 9, 2007

Dear Mr. Martin:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

This letter will allow you to begin marketing your device as described in your Section 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Office of Compliance at (240) 276-0115. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its Internet address http://www.fda.gov/cdrh/industry/support/index.html.

Sincerely yours,

Ciliu Lin, Pi

Director

Division of Anesthesiology, General Hospital, Infection Control and Dental Devices Office of Device Evaluation Center for Devices and Radiological Health

G.Michael OMS

Enclosure

Indications for Use

510(k) Number (if known):

Device Name: Invacare Flyer, M	Model XPO100		
Indications for Use: The Invacare Flyer (Model XPO100) is intended to be used by patients with respiratory disorders who require supplemental oxygen. It supplies a high concentration of supplemental oxygen and is used with a nasal cannula to channel oxygen from the concentrator to the patient. The Invacare Flyer can be used in a home, institution, vehicle and various mobile environments. The Invacare Flyer does not nor is it intended to sustain or support life.			
Prescription Use	AND/OR	Over-The-Counter Use (21 CFR 801 Subpart C)	
(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF NEEDED)			
MMM	CDRH, Office of	Device Evaluation (ODE)	
(Division Sign-Off) Division of Anesthesiology, General I Infection Control, Dental Devices	-lospital		
510(k) Number: <u>K07192</u>	8	Pa	ige 1 of